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WAR DEPARTMENT

**BASIC FIELD MANUAL**

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Volume III

**BASIC WEAPONS** JUL 24 1932

PART ONE

**RIFLE COMPANY**

CHAPTER 6

**MUSKETRY**



**BASIC FIELD MANUAL**  
**VOLUME III, BASIC WEAPONS**  
**PART ONE**  
**RIFLE COMPANY**  
**CHAPTER 6**  
**MUSKETRY**

CHANGES }  
No. 2 }

WAR DEPARTMENT,  
WASHINGTON, *January 3, 1939.*

Basic Field Manual, Volume III, Part One, Chapter 6, March 1, 1932, is changed as follows:

**34. Moving targets.—a. Vehicles.—(1) General.**—Rifle units will be trained to engage large moving targets such as enemy tanks, armored vehicles, and trucks at ranges of 500 yards or less. Rifle fire at armored vehicles at ranges greater than 500 yards is exceptional. It may be employed to drive off or harass unarmored vehicles. Rifle units will be indoctrinated in the principle that in the event of tank attack they must stand their ground, take cover, and deliver the maximum possible aimed fire with armor-piercing or ball ammunition at the enemy tanks and at enemy foot troops which may accompany or support them.

**(2) Leads.**—The basic principles involved in firing at moving targets are simple. Targets which cross the line of sight at any angle are classified as crossing targets. In firing at targets which cross the line of sight the firer must aim ahead of the target so that the paths of the moving target and bullet will meet. Such aim, taken ahead of the target, is called the lead and is applied in target lengths. In fire directed at targets which cross the line of sight at ranges of 500–100 yards, a lead of two target lengths is used. If the target crosses at ranges of less than 100 yards, aim is taken at the forward edge of the target. Targets which approach directly toward the firer or recede directly from the firer, will, for all practical purposes, meet the bullet on its path and are classified as *no lead targets*.





## BASIC FIELD MANUAL

(3) The technique of fire for the rifle and for the Browning automatic rifle does not depend upon tracer ammunition or observation of strike. It is necessary that the individual rifleman or automatic rifleman be able to keep his fire on his target without assistance and the technique contained herein is based on this principle. Individuals must be trained to deliver a rapid and accurate fire and to sustain their fire by rapid reloading.

(4) *Technique of fire at moving ground targets.*—(a) Fire is opened at ranges of 500 yards or less.

(b) With the U. S. rifle M1903 (Springfield) the battle sight is used. Weapons without a battle sight use a setting of 300 yards.

(c) On approaching or receding targets the firer holds his aim on the center and squeezes off his shot.

(d) At crossing targets the firer alines his sights on a point behind the target and swings his aim through the center to a lead of two target lengths in front of the target. The rifle is kept swinging and the shot squeezed off when the proper lead is reached. If the target is within 100 yards he maintains his aim on the forward edge.

(e) Firing is as rapid as proper aiming will permit.

(f) With the Browning automatic rifle equipped with bipod and hinged butt plate, when the firer is in the prone position, automatic fire in bursts of 5 to 10 rounds may be used. When the firer is not in the prone position or when armed with the Browning automatic rifle without bipod and hinged butt plate, semiautomatic fire (rapid single shots) should be used.

(5) *Fire distribution.*—(a) In general the rifleman and automatic rifleman of front line units will engage the leading elements of approaching targets during tank attacks. Leaders must be careful to insure that sufficient fire is also directed on enemy foot troops or weapons which may accompany or support such attack.

(b) Leaders will be especially alert to direct fire on new targets appearing in the foreground or on the flanks. Whenever possible, squad leaders will designate targets and direct the fire of their units.



## BASIC FIELD MANUAL

(c) Individuals will be trained to open fire on sudden targets without waiting for command. Fire will ordinarily be maintained on the selected target until it is obviously disabled or destroyed, until a more dangerous target appears, or until fire on a new target is ordered.

(d) All men will be trained to switch their fire from distant targets to dangerous targets which appear suddenly at close range.

(6) *Place in training.*—(a) Moving target firing is an integral part of the firing at field targets (sec. VII) prescribed for the soldier's training in musketry. As such, it follows his instruction in marksmanship and in the subjects covered in sections I to VI, inclusive, in musketry.

(b) Wherever possible, and especially in mobilization training, moving target firing will be conducted on suitable ranges with service ammunition as an essential part of the unit's firing at field targets (sec. VII). Such work should be preceded by a brief period of instruction in the technique of fire involved and in the local range and safety requirements. This instruction should preferably be given at the scene of the field firing and constitutes all of the specialized preliminary training necessary for excellent results in moving target firing.

(c) Moving target firing with service ammunition may be undertaken by small units or by units as large as the platoon. It is not executed by individuals.

(d) When time and ammunition allowances permit, 1,000-inch moving target firing and other more extensive preliminary instruction may be included in training schedules. Advantage may be taken of indoor ranges and caliber .22 firing to impart instruction in this subject. In general, the instructional material contained in Basic Field Manual, Volume III, part four B, and especially in section IV thereof, will be found useful for training in firing at moving targets.

(7) *Targets and ranges.*—(a) The targets and ranges shown in section IX of Basic Field Manual, volume III, part four B, are suitable for the use of rifle units in their field firing at moving targets.

b. *Personnel.*—Firing at personnel as moving targets with either the rifle or automatic rifle presents a simple problem



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BASIC FIELD MANUAL, VOLUME III

BASIC WEAPONS

PART ONE

RIFLE COMPANY

CHAPTER 6

MUSKETRY

WAR DEPARTMENT,

WASHINGTON, *January 2, 1936.*

Basic Field Manual, Volume III, Part One, Chapter 6, March

1, 1932, is changed as follows:

22. Scope and importance

\* \* \* \* \*

d. This form of instruction also lends itself to indoor instruction when lack of facilities or weather conditions make it desirable.

[A. G. 062.11 (12-3-35).] (1935.)

23. Description of target.—a. A landscape target is a panoramic picture of a landscape, and is of such size that all, or nearly all, of the salient features will be recognizable at a distance of 1,000 inches. The standard target is the series A target of five sheets in black and white.

b. Rescinded.

[A. G. 062.11 (12-3-35).] (1935.)

25. Preparation of targets.—a. *Mounting.*—(1) The sheets are mounted on frames made of 1- by 2-inch dressed lumber, with knee braces at the corners. The frames for the target sheets are 24 by 60 inches. These frames are covered with target cloth, which is tacked to the edges. It is advisable to paint the frames, but it is not necessary.





(2) The target sheets are mounted as follows: Dampen the cloth with a thin coat of flour paste and let it dry for about an hour; apply a coat of paste similarly to the back of the paper sheet and let it dry about an hour; apply a second coat of paste to the back of the paper and mount it on the cloth; smooth out wrinkles, using a wet brush or sponge, and work from the center to the edges. The frame must be placed on some surface which will prevent the cloth from sagging when the paper is pressed on it. A form for this purpose can easily be constructed. It must be of the same thickness as the lumber from which the frames are built, and must have approximately the same dimensions as the aperture of the target frame.

*b. Target frames.*—Panels mounted as described above are set in a vertical frame consisting of posts (about 4 by 4 inches) of sufficient height, placed upright in the ground, 5 feet from center to center, with horizontal pieces of 2 by 4 inches to support the panels, braced to insure stability. The panels are supported by cleats and dowels in order to allow for easy removal.

*c. Range indicators.*—In order to make all elements of target designation complete, assumed ranges must be used on landscape targets. Small cards on which are painted appropriate numbers representing yards of range are tacked along one or both edges of a series of panels. The firers must be cautioned that the range announced in any target designation is for the sole purpose of designating the target, and that the sight setting necessary to zero their rifles must not be changed.

*d. Scoring devices.*—(1) A squad may be brought up to the target and there view the results of its firing. However, scoring the exercises will tend to create competition between squads and will enable the instructor to grade their relative proficiency. A scoring device conforming in size to the 50- and 75-percent shot groups to be expected of average shots firing at 1,000 inches, and at reduced ranges, can easily be made from wire, or a better one may be prepared by imprinting a scoring diagram on a sheet of transparent celluloid. After firing has been completed, the zones can be shown to the squad by applying the scoring device to the target.



(2) While shot groups are in the form of a vertical ellipse, the 50- and 75-percent zones should be shown by the devices as rectangles. This is for convenience in their preparation. For a distance of 1,000 inches the 50-percent zone is a rectangle  $2\frac{1}{2}$  inches high by 2 inches wide; the 75-percent rectangle is 5 inches high by 4 inches wide. For a distance of 50 feet the 50-percent zone is a rectangle  $1\frac{1}{2}$  inches high by 1.2 inches wide; the 75-percent rectangle is 3 inches high by 2.4 inches wide. The target is at the center of the inner rectangle, or 50-percent zone.

(3) For a linear target, such as a small area over which the automatic rifleman will distribute his fire, the 50-percent zone is formed by two parallel lines, drawn parallel to the longer axis of the target (area) and with the target midway between those lines. For a distance of 1,000 inches the lines should be  $2\frac{1}{2}$  inches apart; for a distance of 50 feet the lines should be  $1\frac{1}{2}$  inches apart. Two additional lines, similarly drawn, form the 75-percent zone. For a distance of 1,000 inches the lines should be 5 inches apart; for a distance of 50 feet the lines should be 3 inches apart. The width of the zones will vary according to the size of the target selected. For a distance of 1,000 inches the zones extend 1 inch beyond each end of the target; for a distance of 50 feet the zones extend .6 inch beyond each end of the target. The zones are then divided into a convenient number of equal parts, the number depending on the length (width) of the target and the number of men firing.

[A. G. 062.11 (12-3-35).] (1935.)

Figure 3, Landscape target assembly and details, is rescinded.

[A. G. 062.11 (12-3-35).] (1935.)

Figure 4, Method of lining up recording sheet, is rescinded.

[A. G. 062.11 (12-3-35).] (1935.)

**26. Zeroing-in of rifles.**—*a.* It will be necessary to zero-in the rifles used before firing exercises on the landscape target. A blank target with a row of seven 1-inch-square black pasters about 6 inches from, and parallel with, the bottom edge of the target should be prepared and used for this purpose. In all firing for zeroing-in, sandbag rests are used.



b. \* \* \*

\* \* \* \*

(3) The instructor causes each firer to set his sights at zero elevation and zero windage, or 100 yards and zero windage for the service rifle, and checks each rifle.

(4) Each man is assigned, as an aiming point, the particular small black paster which corresponds to his position in the squad.

(5) Rifles are loaded with three rounds only, at the command of the instructor.

(6) Each man fires three shots at his spotter at the command: **THREE ROUNDS, FIRE AT WILL.**

\* \* \* \*

(8) The instructor and squad leader inspect the target and give each man the necessary correction, based upon the location of the center of impact of the resultant shot group, for his next shot; as "Up 1 minute, right one-half point"; or, for the service rifle, "Up 25, left 1."

(9) The firing continues as outlined above until all rifles are zeroed in; that is, until each man has hit his aiming paster.

c. For the cal. .22 rifle with the Lyman receiver sight, at a distance of 1,000 inches, a change of 5 minutes in elevation will move the strike of the bullet about  $1\frac{1}{2}$  inches. A change of one point of windage moves the strike about  $1\frac{1}{4}$  inches. At a distance of 50 feet a change of 6 minutes in elevation will move the strike of the bullet about 1 inch, and a change of one point of windage, about  $\frac{3}{4}$  of an inch. For the cal. .30 rifle, at a distance of 1,000 inches, changes of 25 yards in elevation and one point of windage move the strike of the bullet about 1 inch in each direction. At a distance of 50 feet a change of 25 yards in elevation and one point of windage will move the strike of the bullet about  $\frac{3}{8}$  of an inch in each direction.

[A. G. 062.11 (12-3-35).] (1935.)

Figure 5, Scoring sheet for landscape targets (point target), is rescinded.

[A. G. 062.11 (12-3-35).] (1935.)

Figure 6, Scoring sheet for landscape targets (area targets), is rescinded.

[A. G. 062.11 (12-3-35).] (1935.)



## 27. Firing procedure.—\* \* \*

\* \* \* \*

e. The squad leader orally designates the target. Reference to panels to indicate direction should not be allowed in the designation. To complete the fire order, the squad leader adds *fire at will*.

f. When the squad has completed firing, the squad leader commands: **CEASE FIRING, OPEN BOLTS**. The squad is taken forward to examine the target. The target panel is removed, scored, and marked with the squad number, and replaced with a new panel.

\* \* \* \*

[A. G. 062.11 (12-3-35).] (1935.)

## 28. Scoring.—a. \* \* \*

(1) Number of rounds fired, 25.

(2) Value of each hit in 50 percent zone, 4.

(3) Value of each hit in 75 percent zone, 2.

NOTE.—A satisfactory distribution of the ammunition is, automatic rifleman 7 rounds, riflemen 3.

\* \* \* \*

[A. G. 062.11 (12-3-35).] (1935.)

## 29. Exercises.

\* \* \* \*

## c. Exercise No. 11.

\* \* \* \*

(2) *Method*.—The instructor indicates three point targets to the squad leader, giving the nature of each. The squad leader applies the fire of his squad on the three targets in the proportions he believes appropriate. The scoring will be as for concentrated fire on each target, the several scores being combined in totals for the score of the exercise.

\* \* \* \*

[A. G. 062.11 (12-3-35).] (1935.)

BY ORDER OF THE SECRETARY OF WAR:

MALIN CRAIG,  
Chief of Staff.

OFFICIAL:

E. T. CONLEY,  
Major General,  
The Adjutant General.









# BASIC FIELD MANUAL



## Volume III BASIC WEAPONS

### PART ONE RIFLE COMPANY

#### CHAPTER 6

#### MUSKETRY

PREPARED UNDER DIRECTION OF THE  
CHIEF OF INFANTRY

1931



UNITED STATES  
GOVERNMENT PRINTING OFFICE  
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WAR DEPARTMENT,  
WASHINGTON, *March 1, 1932.*

Chapter 6 (Musketry), Part One (Rifle Company), Basic Field Manual, Volume III (**Basic Weapons**), is published for the information and guidance of all concerned.

[A. G. 062.11 (4-13-31).]

BY ORDER OF THE SECRETARY OF WAR:

DOUGLAS MACARTHUR,  
*General,*  
*Chief of Staff.*

OFFICIAL:

C. H. BRIDGES,  
*Major General,*  
*The Adjutant General.*

II

## FOREWORD

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Basic Field Manual, Volume III, Basic Weapons, will be published in six parts as follows:

**PART ONE.** Rifle company. (Each chapter of Part One will be published as a separate pamphlet.)

- Chapter 1. Rifle marksmanship.
- 2. Automatic rifle marksmanship.
- 3. Automatic pistol marksmanship.
- 4. Instruction with the bayonet.
- 5. Instruction with hand and rifle grenades.
- 6. Musketry.

**PART TWO.** Fire-control instruments.

- Chapter 1. Machine-gun instruments.
- 2. 37-mm. gun and 3-inch trench mortar instruments.
- 3. Care, repair, and adjustment of instruments.

**PART THREE.** Machine-gun company.

- Chapter 1. Mechanical training with the machine gun.
- 2. Machine-gun marksmanship.
- 3. Technique of machine-gun fire.
- 4. Barrages and concentrations.

**PART FOUR.** Howitzer company.

- Chapter 1. Mechanical training with the 37-mm. gun and the 3-inch trench mortar.
- 2. 37-mm. gun and the 3-inch trench mortar marksmanship.
- 3. Technique of the 37-mm. gun and the 3-inch trench mortar fire.

**PART FIVE.** Combat practice firing.

- Chapter 1. General.
- 2. Rifle company.
- 3. Machine-gun company.
- 4. Howitzer company.

**PART SIX.** Antiaircraft marksmanship—Infantry weapons.

- Chapter 1. General.
- 2. Rifle and automatic rifle.
- 3. Machine gun, caliber .30.

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3. Automatic rifle marksmanship.

4. Instruction with the weapon.

5. Instruction with band and rifle exercises.

6. Marksmanship.

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2. 37-mm. gun and the 3-inch trench mortar marksmanship.

3. Technique of the 37-mm. gun and the 3-inch trench mortar fire.

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Chapter I. General.

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3. Machine-gun company.

4. Howitzer company.

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2. Rifle and machine-gun fire.

3. Machine-gun, caliber .50.

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# BASIC FIELD MANUAL, VOLUME III

## BASIC WEAPONS

### PART ONE

#### RIFLE COMPANY

#### CHAPTER 6

#### MUSKETRY

(The matter contained herein supersedes TR 145-5, December 12, 1923 (including C1, February 15, 1926; C2, January 3, 1927; and C3, January 2, 1929).)

#### SECTION I

#### INTRODUCTION

1. General.—*a.* Musketry is the application and control of the collective fire of rifle fire units.

*b.* Collective fire is the combined fire of a group of riflemen and automatic riflemen.

*c.* A fire unit is one whose fire in battle is under the immediate and effective control of its leader. The usual rifle fire units are the rifle squad and, at times, the rifle section.

*d.* In studying this chapter for use with cavalry units, the following substitutions should be made:

(1) For *section* substitute *cavalry platoon (dismounted)*.

(2) For *section leader* substitute *platoon leader*.

(3) For *section guide* substitute *platoon sergeant*.

(4) For *platoon* substitute *troop*.

(5) For *infantry soldier* substitute *dismounted cavalryman*.

*e.* The object of musketry training is to give the greatest possible effect to collective fire in battle.

*f.* Prior to musketry training the soldier should have received training in rifle marksmanship, automatic rifle marksmanship, extended-order drill, drill and combat signals, and certain elements of scouting and patrolling.

*g.* Musketry is confined to the mechanism of the application and control of collective fire, and precedes combat practice firing, in which subject it is combined with tactical exercises.

*h.* Training in musketry should begin soon after the completion of the marksmanship courses. For best results combat practice firing should closely follow musketry.

*i.* The units considered herein are the rifle squad and section. The weapons considered are the rifle and automatic rifle.

**2. Importance of rifle fire.**—Effective rifle fire is a characteristic of successful infantry and an element which may determine the issue of battle. Collective fire is most effective when it is the product of teamwork. Rifle squads and sections must be trained to act as efficient and dependable teams in the delivery of collective fire.

**3. Scheme of instruction.**—*a.* From 35 to 70 hours is desirable for this training.

*b.* (1) This instruction is progressive and is divided into five consecutive steps. Each includes some, or all, of the methods previously learned. The steps are as follows:

1. Range estimation.
2. Target designation.
3. Rifle fire and its effect.
4. Landscape target firing.
5. Field firing.

(2) It is not essential that perfection be reached before proceeding to the next step; it is better that such a standard be attained by repetition, applying, in the steps that follow, everything that has already been learned. However, each step should be understood before proceeding to the next.

(3) The instructor thoroughly explains each step in detail. He then makes plain its relation to the subject as a whole. This is followed by a demonstration, which, in turn, is explained by the instructor. The troops then practice the principles and methods previously explained and demonstrated.

(4) Exercises pertaining to each step are hereinafter described in detail. They can be used for demonstrations and instructional practice. Some of them can be used to test fire units, thus introducing the desirable element of competition. These exercises may be changed to be made applicable to local conditions.

## SECTION II

## RANGE ESTIMATION

**4. Importance.**—In battle, ranges are seldom known in advance, so that the effectiveness of fire depends in large measure upon the accuracy of range estimation.

**5. Methods.**—Of the various methods of estimating ranges, only the following are considered in musketry training:

Estimation by eye.

Use of tracer bullets.

Observation of fire.

*a. Estimation by eye*—(1) *Necessity for training.*—The usual method of estimating ranges in combat is estimation by eye. Since untrained men make an average error of 15 per cent of the range, when estimating by eye, and the effectiveness of rifle fire is largely dependent upon the accuracy of the estimation, training in this method is therefore very important.

(2) *Application of method.*—(a) The range is measured by applying to it a mental unit of measure 100 yards long. The same method is used as in measuring the length of a board with a ruler, except that the soldier's unit of measure is applied mentally. Thorough familiarity with the 100-yard unit, and with its appearance on varied terrain and at different distances, is necessary if the soldier is to apply it accurately.

(b) Application of the unit of measure beyond 500 yards is difficult. For such ranges a point is selected halfway to the target. The 100-yard unit of measure is then applied to the halfway point, and the result is multiplied by two.

(c) The average of a number of estimates by different men will generally be more accurate than a single estimate. This principle is used in musketry and in combat when time permits by taking the average of the estimates of the squad leaders, specially trained estimators, or the members of a squad.

(3) *Conditions affecting appearance of objects.*—(a) In some cases much of the ground between the observer and the target will be hidden from view, and the application of the unit of measure will be impossible. In such cases the range is estimated by the appearance of objects.

(b) Whenever the appearance of objects is used as a basis for range estimation, the observer must make allowance for the effects noted below:

1. Objects seem nearer—

- (a) When the object is in a bright light.
- (b) When the color of the object contrasts sharply with the color of the background.
- (c) When looking over water, snow, or a uniform surface, like a wheat field.
- (d) When looking from a height downward.
- (e) In the clear atmosphere of high altitudes.
- (f) When looking over a depression most of which is hidden.

2. Objects seem more distant—

- (a) When looking over a depression most of which is visible.
- (b) When there is a poor light or fog.
- (c) When only a small part of the object can be seen.
- (d) When looking from low ground upward toward higher ground.

(4) *Exercises.*—(a) *Exercise No. 1.*

1. *Purpose.*—To familiarize the student with the unit of measure, 100 yards.

2. *Method.*—The unit of measure, 100 yards, is previously staked out over varied ground, using markers that will be visible up to 500 yards. The men are required to become thoroughly familiar with the appearance of the unit of measure from the prone, kneeling, and standing positions at various ranges. They do this by moving away from and in prolongation of the lines staked out and studying the appearance of the unit from distances of 100, 200, 300, and 400 yards.

(b) *Exercise No. 2.*

1. *Purpose.*—To illustrate the application of the unit of measure.

2. *Method.*—Ranges up to 900 yards are measured accurately and marked at every 100 yards by large markers or target frames, each bearing a number to indicate its range. Men undergoing instruction

are then placed about 25 yards to one side of the prolonged line of markers and directed to place a card, hat, or some other object before their eyes so as to cover from view all of the markers. They are then directed to apply the unit of measure five times along a straight line in the general direction but slightly to one side of the markers. When they have selected the final point reached by mentally applying the unit to the ground five times, the eye cover is removed and the estimations of the successive 100-yard points and the final point are checked against the markers. Accuracy is gained by repeating the exercise.

3. Ranges greater than 500 yards are then considered. With the markers concealed from view in the same manner as explained in 2 above, men estimate the ranges to points which are obviously over 500 yards distant and a little to one side of the line of markers. As soon as they have announced each range they remove their eye covers and check the range to the target and to the halfway point by means of the markers. Prone, sitting, or kneeling, and standing positions are used during this exercise.

(c) *Exercise No. 3.*

1. *Purpose.*—To give practice in range estimation.
2. *Method.*—From a suitable point ranges are previously measured to objects within 1,000 yards. The instructor conducts the class to the point where the men are required to estimate the ranges to the various objects that are pointed out by the instructor, writing their estimates upon paper previously issued. At least one half of the estimates are made from the prone or sitting positions. Thirty seconds are allowed for each estimate. When all ranges have been estimated the papers are collected and the true ranges announced to the class. Individual estimates and squad averages are posted on bulletin boards accessible to all members of the class.

b. *Use of tracer bullets.*—(1) When the range to a target is being estimated by use of tracer bullets, the scout, or leader, first estimates the range by eye, fires a tracer bullet, and then

corrects the sight-setting according to the strike of the bullet. The firing and correcting of the sight-setting are continued until a tracer appears to strike the target.

(2) The range thus determined must be corrected for the difference between the trajectory of the tracer bullet and that of the solid bullet. When using M1906 ball ammunition and M1917 or M1918 tracer ammunition, there is no difference up to 300 yards of range. If the range is 300 yards, or more, the correct sight-setting for the ball ammunition is obtained by deducting 50 yards from the sight-setting used for tracer bullets. No deductions are made for any range when using the M1 (boat-tailed) ball ammunition and the M1928, or later model, tracer.

*c. Observation of fire.*—Observation of fire can be used when the ground is dry, so that the dust kicked up by the bullets is visible. The same care is necessary as in determining the range by tracer bullets. The puffs of dust will appear slightly above the point struck by the bullet and on the side toward which the wind is blowing.

### SECTION III

#### TARGET DESIGNATION

**6. Importance and methods**—*a. Importance.*—Knowledge of how to designate a target is a vital element of musketry. Battlefield targets are generally indistinct; unless their position and extent are shown to the troops, the fire will have little or no effect.

*b. Terms.*—A knowledge of the following terrain features is an essential of target designation: Saddle, crest, military crest, bluff, fill, crossroads, road fork, road junction, road center, draw, ravine, and skyline. These terms are defined in the Infantry Field Manual, Volume I.

**7. Methods.**—The following methods are used to designate targets:

Tracer bullets.

Pointing.

Oral description.

*a. Tracer bullets.*—(1) Tracer bullets are the quickest, surest, and simplest means of designating a target. Their use, however, has limitations, for they may disclose our position to the

enemy, and the effect of a sudden burst of fire is lessened by preceding it with tracers.

(2) To designate a point target, the scout, or leader, announces "Range 500, watch my tracers," then fires a tracer at the target. If the target has width, the flanks are indicated by tracer bullets and announced as "Left flank" and "Right flank."

*b. Pointing.*—Targets may be pointed out either with the arm or rifle. Pointing may be supplemented by oral description. To use the rifle for this purpose, it is canted to the right and aimed at the target. The head is then straightened up without moving the rifle. A soldier standing behind can look over the shoulder through or over the rear sight and pick up the target. If time permits, a bayonet may be stuck into the ground, at an angle of about 45°, and the rifle rested on the hilt of the bayonet and pointed at the target.

*c. Oral description.*—(1) *Use.*—Oral description is often used by section and squad leaders to designate targets to their fire units. The section leader can seldom designate the target to his entire section. Pointing is generally used in combination with oral description.

(2) *Relation to fire orders.*—Oral description may be a part of a fire order, but such orders do not always contain a description of the target. "Fire at will" may be the best order for a particular situation. Generally, however, a fire order will contain a description of the target; as *Range 450, at base of lone pine tree* (pointing), *sniper fire at will*. Everything except "fire at will" is a description of the target.

(3) *Elements.*—(a) The elements of oral target designation are—

1. Range.
2. Direction.
3. Nature of target.

(b) These elements are always given in the sequence noted above. When the range is announced, the men set their sights before looking at the target. There is, however, one, and only one, exception to this rule. When the target is expected to be visible for a very short time, it is pointed out before it disappears.

(4) *Simple description.*—When the target is easily visible, simple description is used; for example, *Range 400, to your*



*front, group of enemy.* It will be noted that the range, the direction, and the nature of the target are all covered in correct sequence in this designation.

(5) *Reference point.*—(a) When the target is not easily visible and is not located at some prominent point, the direction to the target is indicated by a reference point. This is a point, preferably a prominent one, with reference to which the location of other points may be determined. Prominent objects are selected for the purpose, where possible, and care is taken that another similar object is not mistaken for the one intended. A reference point on a line with the target, and beyond it, will give greater accuracy than one between the observer and the target.

(b) When the reference point is on line with the target, the description will be as follows:

Range: 450.

Reference: Church spire.

Target: Machine gun in edge of woods. (Fig. 1, target at F.) In this case the target is 450 yards from the observer, and on a line with, but not at, the reference point. If there is no suitable reference point on a line with the target, one is selected elsewhere. If it is to the right or left of the target, the distance from the target must be determined.

(6) *Sights.*—(a) The difference in direction between the reference point and the target is measured in units called "sights." Assume that the rifle is pointed in the direction of the reference point and that it is found that when the left edge of the raised sight leaf is in line with the reference point, the right edge of the sight leaf will be in line with the target. Then the target is one sight width to the right of the reference point, and it is announced as "Right one sight." If the sight leaf can be applied one and one-half times in the above manner, the target is "Right one and one-half sights," and so on.

(b) For uniformity the rifle is held so that the sight leaf, when raised, will be about 14 inches from the eye. This position makes the sight a unit of angular measurement equal to 50 mils.

(c) Finger widths may be used in a manner similar to that of measuring with the rifle sight although this method is less accurate (Ex. No. 5). However measured, the unit of 50 mils is called a sight in musketry.

(d) Oral description by use of a reference point not on a line with the target is illustrated in the following manner (Fig. 1, target at H):

Range: 600.

Reference: Church spire, right two sights.

Target: Group of enemy near crest.

(e) The width or extent of targets is also measured in "sights." (Fig. 1, target on line I-K.)

Range: 400.

Reference: Church spire, left two sights.

Target: Edge of woods extending left two sights. Enemy groups.

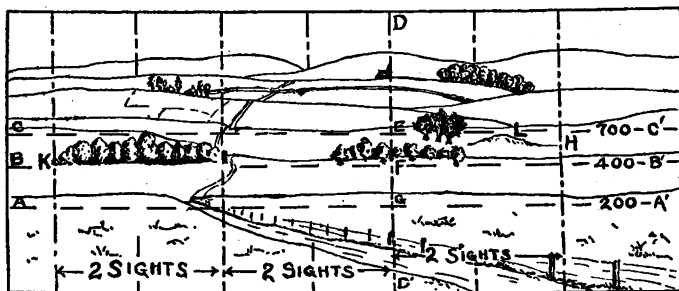


FIGURE 1.—Sight measurements in target designation

(7) *Successive reference points.*—(a) Successive reference points may be used instead of sight measurements (as described above) from one reference point. (Fig. 1, target at L.)

Range: 600.

Reference: Church spire; to the right and at a shorter range, group of three trees; to the right and at the same range.

Target: Machine gun at right end of mound of earth.

(b) A combination of sight measurement and successive reference points may also be used.

(8) *Variations.*—The simplest type of oral description which will fit the conditions will be the most effective. If one end of the target is considerably nearer than the other, the average range is announced. Dispersion will cover the target. Informal or conversational description is used to supplement the formal description when the target is not recognized from the formal

description alone. The latter, however, is usually effective, and will be given first.

*d. Which method to use.*—Troops will be trained in all the methods of target designation explained above. When methods are equally effective, the simplest will be used.

**8. Exercises—*a. Exercise No. 4.***—(1) *Purpose.*—Practice in target designation by means of tracer bullets.

(2) *Method.*—(a) On a class A or class B range a concealed target representing a machine gun is placed near a pit or other bullet-proof shelter. About 500 yards in front of the target a firing position suitable for a section is selected. The position of the target will be visible from the firing position, but the target itself may be invisible, due to its concealment. This concealment should have a natural appearance in order not to attract attention.

(b) The section is deployed along the firing position facing toward the target, and all except the scouts are then faced to the rear.

(c) The scouts take the prone position and are told that the waving of a red flag to their front will represent the firing and smoke from the machine gun.

(d) A man stationed in the pit waves a flag exactly in front of the target for 60 seconds and retires to the protection of the pit.

(e) The section is faced to the front and men take the prone position. Rifles are loaded, the scouts using tracer ammunition and the remainder of the section ball cartridges.

(f) The scouts point out the target by firing tracers and announce the range, which is passed along from man to man.

(g) As soon as each man understands the location of the target he opens fire with the proper sight setting.

(h) The instructor causes firing to cease shortly after all the men are firing.

(i) Noncommissioned officers do not participate in the fire. Squad leaders remain behind their squads and observe the conduct of their men. They move about freely. The section leader and section guide assist the instructor.

(j) After firing ceases, sight settings are checked by squad leaders and the target is examined or hits signaled to the section.

*b. Exercise No. 5—(1) Purpose.*—To teach use of sights and fingers for lateral measurement.

(2) *Method.*—(a) A number of short vertical lines 1 foot apart are plainly marked on a wall or other vertical surface. At a distance of 20 feet from the wall a testing line is drawn or marked out by stakes.

(b) The instructor explains that the vertical lines are one sight apart when measured from the testing line, so that the correct distance from the rifle sight leaf to the eye can be determined by pointing the rifle at the vertical lines and moving the eye along the stock until the raised sight leaf exactly covers the space between one of the vertical lines and the next line to the right or left. The instructor demonstrates with a rifle while explaining.

(c) The men take positions on the testing line and each determines the proper distance of his eye from the sight as explained by the instructor. The position of the eye with reference to the stock is carefully noted or marked on the stock.

(d) The instructor then explains and demonstrates the use of fingers in measuring sights. First he holds his hand, with palm to rear and fingers pointing upward, at such distance from his eye that each finger will measure one sight on the wall. Then, so that he can later redetermine this distance, he lowers his hand to his side without changing the angle of wrist or elbow and notes the exact point at which the hand strikes the body. Thereafter when measuring with the fingers he first places his hand at this predetermined point and raises his arm to the front without changing the angle of wrist or elbow. His hand will then be in the correct position for measuring sights by fingers.

(e) The men determine the proper distance of fingers from the eye as explained by the instructor.

(f) Practice in lateral measurement is given, using convenient objects within view and using both sights and fingers.

*c. Exercise No. 6—(1) Purpose.*—Practice in target designation by pointing with the rifle.

(2) *Method.*—(a) The squad, with the exception of the squad leader, is formed faced to the rear. The instructor then points out the target to the squad leader, who takes the kneel-

ing or prone position, estimates the range, adjusts his sight, aligns his sights on the target, and then calls, "Ready."

(b) The members of the squad then move in turn to a position directly behind the squad leader and look through the sights until they have located the target. The range is given orally by the squad leader to each individual. If the target has width, the squad leader, after giving range, announces so many sights right or left.

(c) As soon as each man has located the target he moves to the right or left of the squad leader, sets his sight, places his rifle on the bayonet rest or sandbag and aligns his sights on the target.

(d) The instructor, assisted by the squad leader, verifies the sight setting and the alignment of the sights of each rifle.

*d. Exercise No. 7—(1) Purpose.*—Practice in target designation by oral description.

(2) *Method.*—(a) The squad is deployed faced to the rear. The squad leader is at the firing point, where sandbags or bayonet rests have been provided for seven rifles.

(b) At a prearranged signal the target is indicated by the display of a flag. When the squad leader states that he understands the position of the target the flag is withdrawn.

(c) The squad is then brought to the firing point, placed in the prone position and each man required to set his sight, using the sandbag or bayonet rest to sight his rifle on the target according to the oral description of the squad leader. The squad leader gives his target designation from the prone position.

(d) The squad leader's designation is checked from the ground. The men are required to leave their rifles, properly pointed, on the rests until checked by the instructor or squad leader.

## SECTION IV

### RIFLE FIRE AND ITS EFFECT

9. *Trajectory.*—*a. Nature.*—The trajectory is the path followed by a bullet in its flight through the air; it is the same for the automatic rifle as for the rifle. The bullet leaves the rifle at a speed of 2,700 feet per second. Because of this great speed the trajectory at short ranges is nearly straight or flat.

*NOTE.*—All references in this section to the ballistic qualities of rifle bullets apply only to the M1906 ball ammunition.

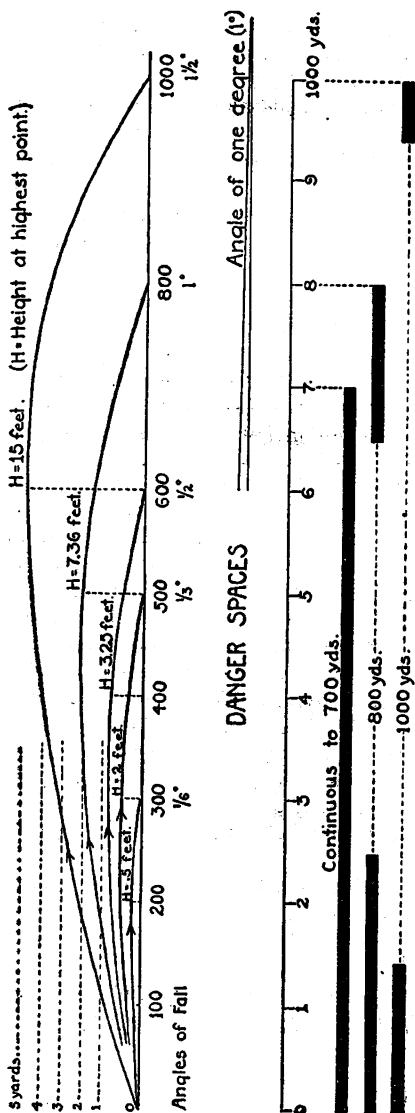


FIGURE 2.—Trajectory diagram (vertical scale is 20 times horizontal scale)

*b. Danger space.*—The danger space consists of two parts; from the rifle to the point at which the bullet rises above the height of a man standing and the space from the point where it again falls to the height of a man to the target. The trajectory for a range of 700 yards does not rise above the height of a man standing. Therefore, it is said that the danger space for that range is continuous between the muzzle of the gun and the target. For ranges greater than 700 yards, the bullet rises above the height of a man standing, so that only parts of the space between the gun and the target are danger spaces.

10. *Dispersion.*—Due to differences in ammunition, aiming, holding, and wind effects, a number of bullets fired from one rifle will not all follow in one path but will scatter or disperse slightly. The trajectories of those bullets therefore form an imaginary cone-shaped figure called the cone of dispersion. Dispersion is greater in the case of group firing because there are more variations to cause it.

11. *Shot groups.*—When the cone of dispersion strikes a vertical target it makes a pattern on it that is called a vertical shot group. Shot groups made on horizontal targets or surfaces are called horizontal shot groups. Due to the flatness of trajectory, horizontal shot groups have a length of from 100 to 400 yards, depending chiefly on the range.

12. *Beaten zone.*—The beaten zone is the ground struck by the bullets forming a cone of dispersion. When the ground is level, the beaten zone is also a horizontal shot group. The slope of the ground has great effect on the shape and size of the beaten zone. Rising ground shortens the beaten zone. Ground that slopes downward and in the approximate curve of the trajectories will greatly lengthen the beaten zone. Falling ground with greater slope than the trajectory will escape fire.

13. *Classes of fire*—*a.* Fire, as regards direction, is classified in musketry as follows:

(1) *Frontal.*—Fire delivered at right angles to the front of the enemy.

(2) *Oblique.*—Fire delivered at an objective from any direction other than that perpendicular to or parallel to either of its axes.

(3) *Enfilade*.—Fire delivered at an objective from on or near the prolongation of its longer axis. For example, fire delivered from a point on or near the prolongation of the enemy's line.

(4) *Flanking*.—Fire received by an objective from the direction of its flank.

b. Fire, as regards trajectory, is classified as follows:

(1) *Grazing*.—Fire approximately parallel to the ground surface, and close enough thereto to strike an object of a given height. The height of a man standing is usually taken as the determining factor.

(2) *Plunging*.—Fire which strikes the ground or other material object at a considerable angle.

(3) *Overhead*.—Fire delivered over the heads of friendly troops.

c. *Comparison*.—Oblique fire is slightly more effective than frontal. Enfilade and flanking fire are more effective than oblique. Grazing fire is more effective than plunging fire, because the beaten zone is much longer. Overhead fire with the rifle is safe when the ground affords protection to the friendly troops in front or when they are a sufficient distance below the line of fire.

14. *Effect of fire*.—By making use of cover and of the supporting fires of the artillery and machine guns, rifle units will get as near the enemy as possible without opening fire. Normally this should be at ranges less than 600 yards. Snipers or specially selected men may fire at a greater range. A ricochet is effective if it strikes a man soon after it leaves the ground. Rifle fire is seldom used against enemy matériel. Rifle fire is effective and should be used against low-flying planes. Even though hits can no longer be made, fire may be continued when the moral effect is sufficient to keep the enemy under cover and render his fire ineffective. When opposing forces are intrenched and neither side is trying to advance, fire for moral effect alone is of no value.

15. *Exercise No. 8—*a. *Purpose*.—To show trajectories.

b. *Method*.—The unit under instruction watches the firing of a few tracer bullets at targets whose ranges are announced. Ranges of 300, 600, and 800 yards are suitable selections. The flatness of the trajectories is called to the attention of the men.



## SECTION V

## APPLICATION OF FIRE

16. General.—*a.* An enemy attacking will present targets varying from advancing individuals and small groups to groups in defiladed or concealed firing positions. While the application of fire will be simpler when on the defensive, the moving targets at varying ranges and the fact that squads and sections will be dispersed in small groups over areas may make proper application difficult.

*b.* With an enemy on the defensive the targets he presents will usually consist of small groups such as riflemen, automatic riflemen, or machine guns. These groups will form an irregular general line very probably echeloned in depth. They will be placed to secure good fields of fire and to take advantage of cover and concealment. Except at close range they will generally be invisible and their location must be determined by observation of those positions they would logically occupy, by the noise and flash of firing, by movement or other indications. Any of these groups permitted to fire unmolested are of vital danger to our advance.

*c.* In the attack the necessity for extended and irregular formations echeloned in depth to take advantage of cover and concealment and prevent excessive losses may make it difficult to occupy positions from which the fire of the entire unit can be controlled. In many cases the unit may not be able to open fire as a whole but will have to build up fire gradually as individuals or small groups reach a firing position. In some cases a target may only be visible to portions of the unit while in others an efficient, well-controlled fire can be delivered by the entire unit.

*d.* The foregoing conditions should be considered in the preparation of all musketry exercises and an endeavor made to portray, as nearly as possible, battlefield conditions. Exercises should not be based on the more or less regular formations prescribed in the mechanics of extended order drill.

*e.* Considering the above, in the occupation of a firing position, the location of sections in the section area and squads in the squad area should be made with due regard to the following requirements. When these requirements conflict, it

is the duty of leaders to weigh the importance of each and make the best dispositions possible under the conditions.

(1) Good field of fire to the front.

(2) Use of cover and concealment.

(3) An indefinite and inconspicuous formation which will suit the terrain and be hard to see.

(4) Control of fire by unit leader.

17. **Kinds of fire.**—The size and nature of the target presented may call for the fire power of the entire group or only certain parts. The fire of a group must necessarily be either distributed or concentrated fire.

*a. Distributed fire.*—(1) Distributed fire is fire distributed in width for the purpose of keeping all parts of the target under effective fire. It is habitually used on targets having any considerable width and no special command for its use is necessary.

(2) Distributed fire is individual and collective. Each rifleman fires his first shot on that portion of the target corresponding generally to his position in the squad. He then distributes his remaining shots over that part of the target extending a few yards to the right and left of his first shot. The amount of target he can cover to the right and left of his first shot will be that on which he can deliver accurate fire without having to change his firing position. This will usually be from 5 to 10 yards. It will depend upon the range and the position of the firer. Unless otherwise instructed, the automatic rifleman will habitually cover the entire target. This method enables squad leaders to distribute the fire of their units so as to cause the entire target to be kept under fire.

(3) Distributed fire is the quickest and most effective method of insuring that all parts of the target are brought under fire. When it becomes necessary to engage other targets, the squad leader will shift the fire of such weapons as may be necessary.

*b. Concentrated fire.*—Concentrated fire is fire directed at a single point. This fire has great effect but only at a single point. Machine guns and automatic rifle groups are examples of suitable targets for concentrated fire.

18. **Rate of fire.**—The soldier fires at the rate of fire most effective under existing conditions. To exceed this rate is a waste of ammunition.

*a. Rifle.*—In rapid-fire practice the soldier is trained to shoot from 7 to 10 aimed shots per minute, depending upon the

range. In battle, the difficulty in picking out indistinct targets will generally make a slower rate of fire advisable.

*b. Automatic rifle.*—The high rate of fire of the automatic rifle makes it very important in maintaining fire power. Every effort will be made to keep the automatic rifles in action. The most effective rate of fire is from 40 to 60 shots per minute. The fire of automatic rifles is particularly valuable against targets requiring the greatest volume of fire.

**19. Fire discipline.**—*a.* Fire discipline is a state of order, coolness, efficiency, and obedience, existing among troops engaged in a fire fight. Fire discipline is necessary for proper control by leaders and upon this control depend teamwork and effectiveness of the collective fire of the unit. The training necessary to insure good fire discipline can not be completed during the brief period of the course in musketry. Training in fire discipline starts with the soldier's first drill and continues throughout his military training. Any drill or exercise which develops alertness and the habit of obedience or other soldierly qualities will aid in developing the character essential to fire discipline.

*b.* Fire discipline is maintained by leaders chiefly by their example of coolness and courage. Replacement of casualties is an element of fire discipline which keeps the unit working as a team in spite of losses.

*c.* Fire discipline in the section is maintained by the section guide. While the responsibility for fire discipline remains with the section leader, it is best that he should be free to devote his entire attention to the enemy and to the general control of his section. The section guide sees that the squad leaders properly perform their duties, and any breaches of discipline in a squad are preferably checked through the squad leaders.

*d.* Fire discipline in the squad is maintained by the squad leader. His position in the rear of the squads permits him to observe its members easily.

*e.* In an emergency, or when the control by section leader is impracticable, the squad leader acts on his own initiative in carrying out what he believes to be the desire of the section leader.

*f.* Similarly, if any group of individuals find themselves without a leader, it is essential that one of them assume leadership of the group and carry out its mission or attach it to the nearest organized unit.

*g.* An individual separated from his squad fights on his own initiative only when he has reason to believe that his single effort will accomplish some important result. Otherwise he reports to the nearest leader at once.

**20. Fire control.**—*a. Meaning.*—Fire control is the regulation of rifle fire by section and squad leaders. It enables leaders to bring the fire of the rifles and automatic rifles of their units to bear on a designated target in the most effective manner. With fire control, leaders can cause all or a desired portion of their men to cease firing promptly or to engage a new target. Leaders can also increase or decrease the rate of fire.

*b. Importance.*—Fire control is essential to teamwork and the effectiveness of collective fire. Without fire control, men can not intelligently help to carry out the plan of the leader of the unit. Uncontrolled fire is often worse than useless. It wastes ammunition and discloses the position of troops to the enemy with no compensating advantages.

*c. How exercised.*—(1) Squad and section leaders exercise fire control by means of orders, commands, and signals.

(2) The effectiveness of the section leader's control of the section will depend very largely on the alertness of the squad leaders in glancing frequently at the section leader for signals. When signals are to be expected the squad leaders glance at the section leader about once every 10 or 15 seconds.

(3) The signals most frequently used in fire control are (B. F. M. Vol. II)—

*Signals for range.*

*Commence firing.*

*Fire faster.*

*Fire slower.*

*Cease firing.*

*Assault fire.*

*Fix bayonets.*

(4) Fire control of the section is retained by the section leader as long as he is able to do so. The section leader will often lose control of the section but should regain it as soon as conditions permit.

(5) In the squad, the fire control is exercised by the squad leader alone. In the section, fire control is exercised by the section leader assisted by the section guide.

**21. Duties of leaders.**—The following summary of duties of leaders is by no means complete as it relates only to their duties in musketry.

*a. Section leader.*—The primary duties of the section leader relate to the enemy and the most effective use of the fire power of his section. He—

- (1) Carries out orders of platoon leader.
- (2) Selects firing positions.
- (3) Determines ranges.
- (4) Designates targets and issues fire orders to the squad leaders.
- (5) Controls fire of section.
- (6) Observes enemy and effect of fire.
- (7) Prevents exhaustion of ammunition.
- (8) Replaces leaders who are casualties.

*b. Section guide.*—The primary duties of the section guide relate to individual conduct and discipline in the section. He—

- (1) Assists section leader.
- (2) Maintains fire discipline.
- (3) Controls fire of section during absence of section leader.
- (4) Keeps on alert for signals from platoon leader or section leader.
- (5) Replaces section leader when he becomes a casualty.

*c. Squad leader.*—(1) Carries out orders of section leader.

- (2) Selects firing positions for squad.
- (3) Designates targets and issues fire orders.
- (4) Controls fire of squad.
- (5) Maintains fire discipline.
- (6) Observes enemy and effect of fire.
- (7) Keeps on the alert for signals from the section leader.
- (8) Participates in firing only in emergencies when the fire of his rifle is considered more important than supervision of the squad.

## SECTION VI

### LANDSCAPE TARGET FIRING

**22. Scope and importance.**—*a.* After satisfactory progress has been made in the preceding steps, the soldier will be given practice in the application of those lessons by firing at landscape targets.

b. An advantage of this training is the immediate supervision over all members of the firing unit made possible by their close proximity. The instruction is therefore more individual than would be otherwise possible.

c. An added advantage is the accessibility and nature of the targets which permit the application and effect of the fire to be shown in a minimum of time.

d. This form of instruction also lends itself to indoor instruction when lack of facilities or weather conditions make it desirable. When ranges other than 1,000-inch become necessary, proper adjustment for sight setting and arrangement of targets must conform to the range used.

23. Description of target.—*a.* A landscape target is a panoramic picture of a landscape, and is of such size that all, or nearly all, of the salient features will be visible at a distance of 1,000 inches. Standardized sets of landscape targets are issued by the Ordnance Department in three series. Series A has five sheets and presents a more diversified terrain than either series B or C which consist of three sheets each. While series B and C are satisfactory for instruction purposes, it is preferable to use series A when facilities for installing it are available.

b. The landscape-target sheets are lithographed in colors and are relatively expensive. In order to avoid wastage, black and white replicas of the colored targets are furnished for use as recording sheets. They are set up and rifle sights adjusted or harmonized, as explained hereinafter, so that a shot aimed at any point on the colored panel will actually strike the corresponding point on the black and white panel. The colored sheets are known as "target sheets"; the black and white sheets are called "recording sheets." The latter are of the same width and slightly higher than the target sheets and show the identical terrain features. The recording sheets are placed exactly above the target sheets so that corresponding points are in the same vertical plane.

24. Weapons to be used.—Firing at landscape targets should be with cal. .22 rifles, preferably the M 1922 M1 equipped with the Lyman sight. When a sufficient number of those rifles are not available, the cal. .30 rifles may be used.

25. Preparation of targets.—*a. Mounting.*—(1) The sheets are mounted on frames made of 1 by 2 inch dressed lumber, with

knee braces at the corners. The frames for the target sheets are 24 by 59 inches, while those of the recording sheets are the same width but slightly higher. These frames are covered with target cloth, which is tacked to the edges. It is advisable to paint the frames, but it is not necessary.

(2) The colored sheets are mounted as follows: Dampen the cloth with a thin coat of flour paste and let it dry for about an hour; apply a coat of paste similarly to the back of the paper sheet and let it dry about an hour; apply a second coat of paste to the back of the paper and mount it on the cloth; smooth out wrinkles, using a wet brush or sponge, and work from the center to the edges. The frame must be placed on some surface which will prevent the cloth from sagging when the paper is pressed on it. A form for this purpose can easily be constructed. It must be of the same thickness as the lumber from which the frames are built, and must have approximately the same dimensions as the aperture of the target frame.

(3) Recording sheets are not pasted but simply tacked on the frames. Thumb tacks are preferable for this, though carpet tacks battened by small pieces of cardboard are less expensive. These sheets must be tacked on so that they are exactly placed with reference to the corresponding target sheet above which they are set up, a proceeding which must be carried out with great care and accuracy or the results of the shooting will be of little value. The target sheets may be mounted on beaver board instead of canvas-covered frames. Board mounting for the recording sheets is an unsatisfactory arrangement.

*b. Target frames.*—Panels mounted as described above are set in a vertical frame consisting of posts (about 4 by 4 inches) of sufficient height, placed upright in the ground, 5 feet from center to center, with horizontal pieces of 2 by 4 inches to support the panels, braced to insure stability. The panels are supported by cleats and dowels in order to allow for easy removal. The recording panels are placed above the colored panels, care being taken that every point on the recording targets is exactly the same distance above the corresponding point on the colored target and in the same vertical line with it. The distance is 23 inches. This effect can be obtained by the use of a plumb bob and a 2-foot ruler, or of a carpenter's level upon which the 23-inch distance has been marked. Since the black and white targets are tacked on, their position can be shifted slightly until they are correctly placed.

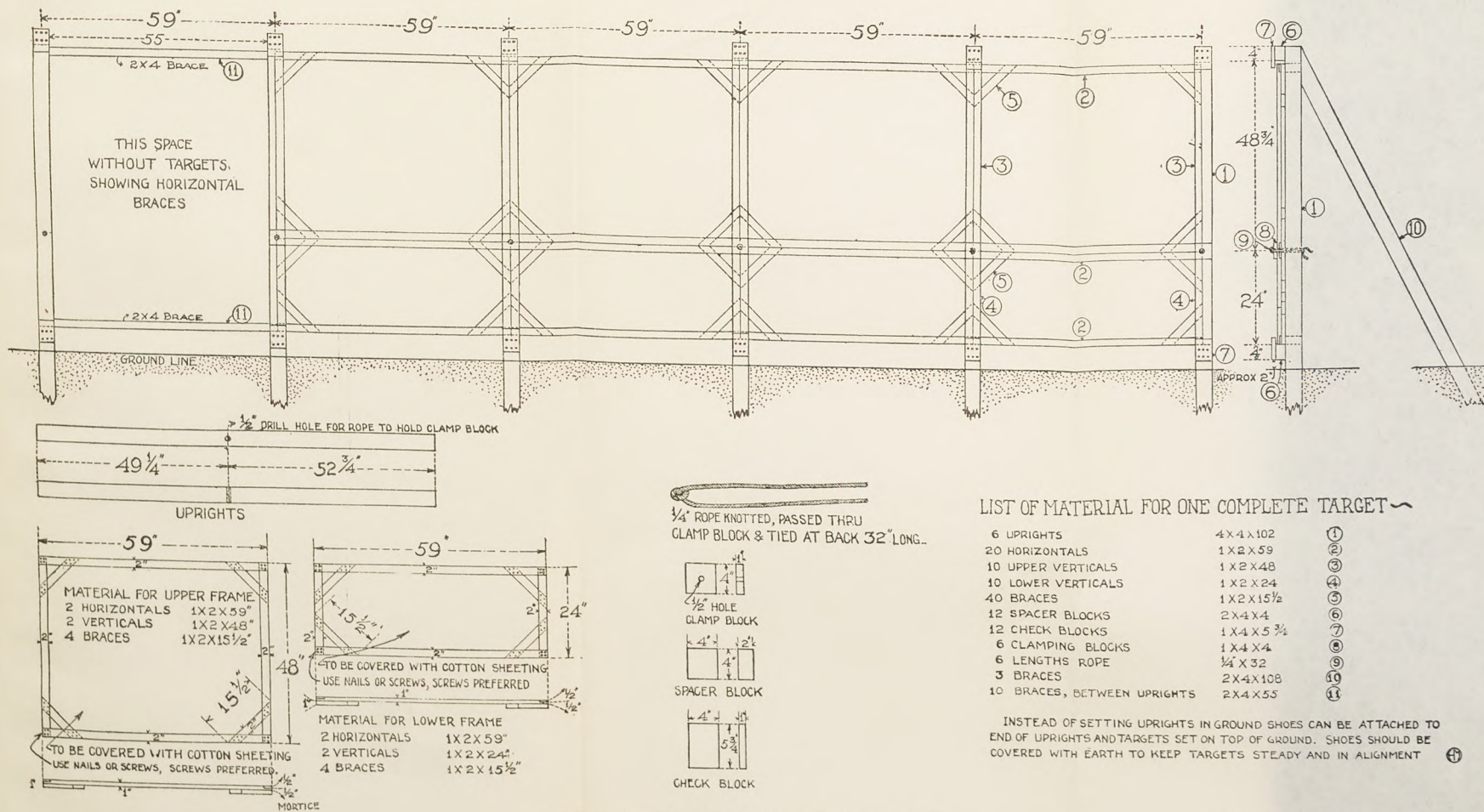
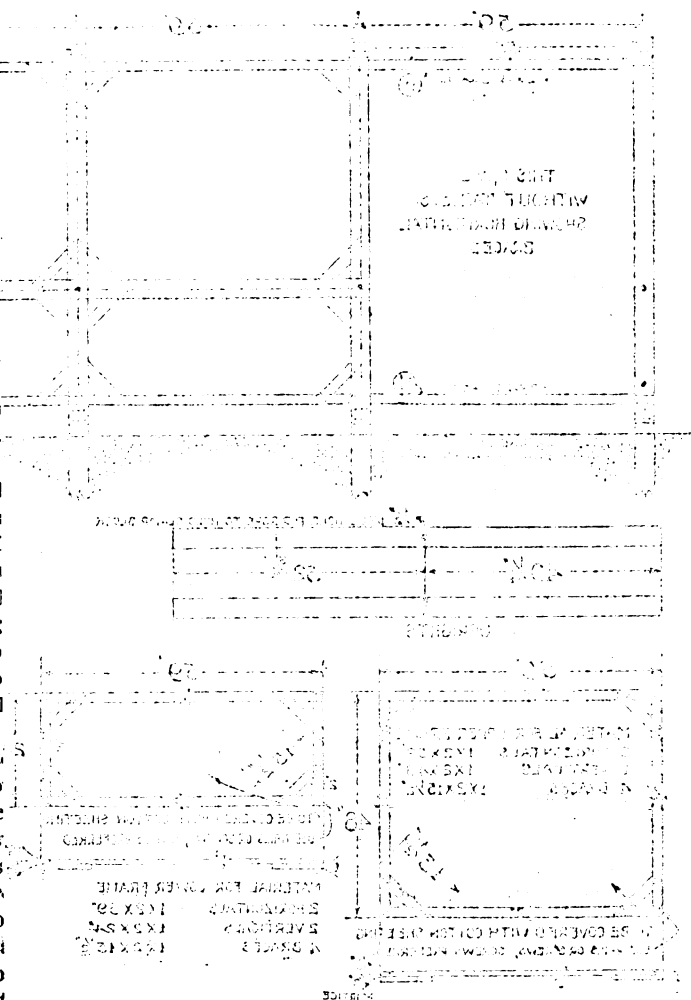


FIGURE 3.—Landscape target assembly and details

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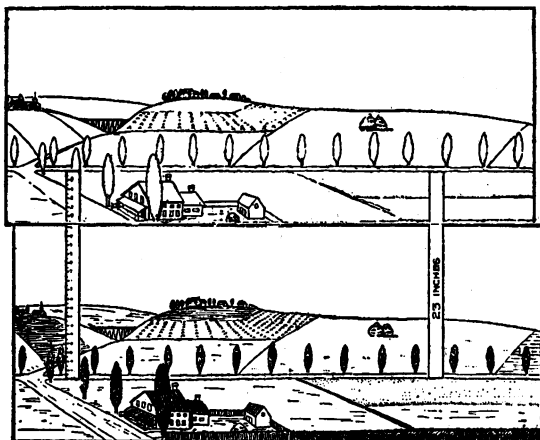


*a. Screens.*—When ready for use, the recording panels, except the one on the extreme right, are covered with screens of target cloth. These are used in order to prevent the firer from observing the effects of the fire until an exercise is completed.

*d. Harmonizing panel.*—The right-hand recording panel is replaced by a "harmonizing" panel in preparation for harmonizing rifles. This is a frame of the same dimensions as the recording panel, but it is covered with white paper instead of a recording sheet. Upon the harmonizing panel is drawn a horizontal line 23 inches above the bottom line of seven small bull's-eyes which are pasted along the upper edge of the right-hand colored panel. Directly above each bull's-eye this harmonizing line is crossed by a vertical line which is called the "windage" line. The harmonizing panel can be inverted, and a second set of harmonizing and windage lines can be drawn. When this panel is adjusted in the target frame, the harmonizing of rifles can commence. The right-hand recording panel must later be replaced if targets on the corresponding colored panel are to be selected during the instruction period.

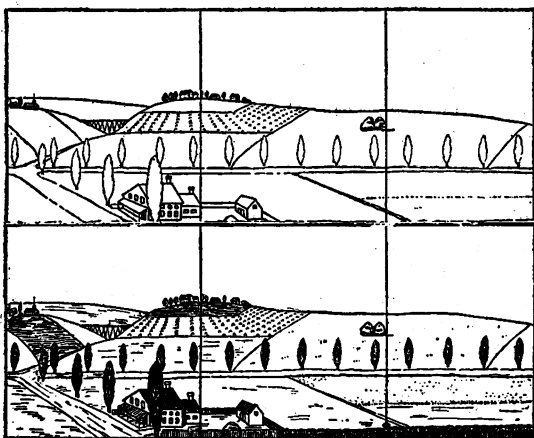
*e. Range indicators.*—In order to make all elements of target designation complete, assumed ranges must be used on landscape targets. Small cards on which are painted appropriate numbers representing yards of range are tacked along one or both edges of a colored series. The firers must be cautioned that the range announced in any target designation is for the sole purpose of designating the target, and that the sight setting necessary to harmonize their rifles must not be changed. If this is not done, the colored panels will probably be hit and rendered unfit for further use.

*f. Small recording sheets.*—(1) A squad may be brought up to the target, and there view the results of its firing. However, in addition to giving visible proof of progress, small recording sheets will tend to create competition between squads and will enable the instructor to grade the work at the end of each day's firing. These may be prepared in advance and in several ways. A pencil sketch or tracing of the targets selected for a problem may be drawn on a piece of paper. A stencil may be made on which a selected target is cut to exact proportions, and a supply of small recording sheets may then be mimeographed. (Figs. 5 and 6.) A tracing can be made on tracing cloth, and copies prepared by blue printing.



TAKE TWO POINTS ON RECORDING SHEET AND SEE THAT MEASUREMENT IS EXACTLY 23 INCHES FROM SAME TWO POINTS ON COLORED PANEL. THIS CHECKS VERTICAL DISTANCE —

**NOTE.**—These measurements must be exact.



THEN TAKE PLUMB BOB AND SEE THAT BOTH PANELS ARE IN LINE HORIZONTALLY, (TAKE SOME PROMINENT OBJECT SUCH AS EDGE OF HOUSE OR TRUNK OF TREE) THEN TACK IN PLACE.

**FIGURE 4.**—Method of lining up recording sheet

(2) It is advisable to show on the small recording sheet the 50 and 75 per cent zones. These represent the 50 and 75 per cent shot groups to be expected of average shots firing at 1,000 inches, and are proportional to corresponding shot groups at longer ranges. While shot groups are in the form of a vertical ellipse, these zones are shown on the recording targets as rectangles. This is for convenience in the preparation of the small targets. The 50 per cent zone is a rectangle  $2\frac{1}{2}$  inches high by 2 inches wide; the 75 per cent rectangle is 5 inches high by 4 inches wide. The target is at the center of the inner rectangle, or 50 per cent zone.

(3) For a linear target, such as a small area over which the automatic rifleman will distribute his fire, the 50 per cent zone is formed by two parallel lines,  $2\frac{1}{2}$  inches apart, drawn parallel to the longer axis of the target (area) and with the target midway between those lines. Two additional lines, 5 inches apart and similarly drawn, form the 75 per cent zone. The width of the zones will vary according to the size of the target selected. The zones extend 1 inch beyond each end of the target. The zones are then divided into equal parts, the number depending upon the length of the target.

(4) These small recording sheets are placed on the recording panel directly over that portion to which they correspond. They will thus be 23 inches above the chosen target on the colored panel. After firing has been completed, the small sheets should be removed, graded, and posted on the bulletin board.

(5) If these small sheets can not be prepared, wire frames conforming to the above-outlined dimensions can easily be made. After firing has been completed, the zones can be shown to the squad by applying the frame to the target on the recording sheet.

**26. Harmonizing sights.**—*a.* If the sights of the cal. .22 rifle are set at 82 minutes elevation, or the sights of the cal. .30 rifle are set at 1,300 yards, a shot fired at a target 1,000 inches away will strike about 23 inches above the point of aim. With a range setting of 1,300 yards on the service rifle, one point right windage is necessary to counteract the drift correction. In all firing for harmonizing, sandbag rests are used.

*b.* The procedure in detail is as follows:

(1) Sights of all rifles are blackened.

(2) The squad is deployed on the firing point; the squad leader takes the proper position in rear of the squad.

(3) The instructor causes each firer to set his sights at 82 minutes elevation and zero windage, or 1,300 yards and one point right windage for the service rifle, and checks each rifle.

(4) Each man is assigned, as an aiming point, the particular small black paster along the upper edge of No. 5 colored panel which corresponds to his position in the squad.

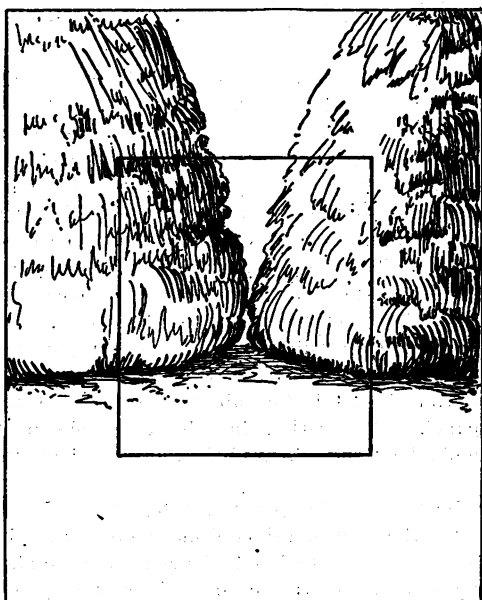


FIGURE 5.—Scoring sheet for landscape targets  
(point target)

(5) Rifles are loaded with one round only, at the command of the instructor.

(6) Each man fires one shot at his spotter at the instructor's command: **ONE ROUND, FIRE AT WILL.**

(7) The instructor commands: **OPEN BOLTS.** The squad leader checks to see that this is done.

(8) The instructor and squad leader inspect the harmonizing panel and give each man the necessary correction for his next

shot; as, "Up one minute, right one-half point"; or, for the service rifle, "Up twenty-five, left one."

(9) The firing continues as outlined above until all rifles are harmonized; that is, until each man has approximately hit the intersection of the lines above his aiming paster.

c. For the cal. .22 rifle with the Lyman receiver sight, a change of five minutes in elevation will move the strike of the bullet about  $1\frac{1}{2}$  inches. A change of one point of windage

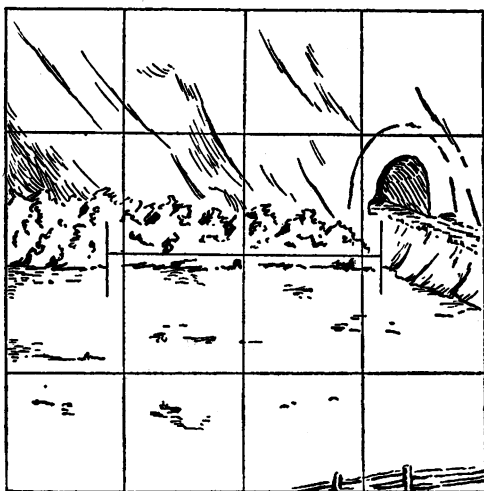


FIGURE 6.—Scoring sheet for landscape targets  
(area targets)

moves the strike about  $1\frac{1}{4}$  inches. For the cal. .30 rifle, changes of 25 yards in elevation and one point of windage move the strike of the bullet about 1 inch in each direction.

**27. Firing procedure.**—The following is the sequence of events in conducting firing exercises:

a. All members of the squad, except the squad leader, face to the rear.

b. The instructor takes the squad leader to the panels and points out the target to him.

c. They return to the firing point; the squad leader takes charge of the squad and causes the men to resume their firing

positions. The sandbag rest is used only by the automatic rifleman, and then only when armed with the automatic rifle.

d. The squad leader gives the command *Load*, cautioning, "— rounds per rifleman and — rounds per automatic rifleman only."

e. The squad leader orally designates the target. Reference to panels should not be allowed in the designation. To complete the fire order, the squad leader adds *fire at will*.

f. When the squad has completed firing, the squad leader commands: *CEASE FIRING, OPEN BOLTS*. The squad is taken forward to examine the target. The small recording target is removed, scored, and marked with the squad number.

g. The instructor holds a short critique after each exercise.

28. *Scoring—*a. *Concentrated fire*.—In concentrated fire the sum of the value of the hits within the two zones is the score for the exercise. For convenience of scoring and comparison, 100 is fixed as the maximum score. Any method of scoring and of distribution of ammunition among members of the squad may be used. The following examples are given as suggested methods:

- (1) Number of rounds fired, 50.
- (2) Value of each hit in 50 per cent zone, 2.
- (3) Value of each hit in 75 per cent zone, 1.

NOTE.—A satisfactory distribution of the ammunition is, automatic riflemen 10 rounds, riflemen 6.

b. *Distributed fire*.—The following is a method of scoring for distributed fire; such as, automatic rifle fire over a small area, or the fire of the squad on an enemy column:

- (1) Number of rounds fired, 50.
- (2) Value of each hit in 50 per cent zone, 2.
- (3) Value of each hit in 75 per cent zone, 1.
- (4) Value of each distribution space (if target is divided into four equal spaces), 25.

(5) The score for distribution, plus the value of all hits, divided by two is the score for the exercise.

29. *Exercises*.—The fire of the automatic rifleman, when armed with the cal. .22 rifle, will be employed against targets appropriate to automatic rifle fire and as though he were firing such weapon.

a. *Exercise No. 9*—(1) *Purpose*.—To teach target designation and to show the effect of concentrated fire.

(2) *Method*.—The squad leader employs the fire of his squad at one point target indicated to him by the instructor.

*b. Exercise No. 10*—(1) *Purpose*.—To teach target designation and the use of the automatic rifle at a separate target.

(2) *Method*.—The instructor indicates two targets to the squad leader. The squad leader applies the fire of the riflemen on one target and the fire of the automatic rifleman on the other.

*c. Exercise No. 11*—(1) *Purpose*.—To teach target designation and the division of the squad fire on three points of concentration.

(2) *Method*.—The instructor indicates three point targets to the squad leader, giving the nature of each. The squad leader applies the fire of his squad on the three targets in the proportions he believes appropriate. The scoring will be as for concentrated fire; the several scoring sheets used being combined in totals for the score of the exercise.

*d. Exercise No. 12*—(1) *Purpose*.—To teach target designation and fire control in diverting part of the fire of the squad to a suddenly appearing target.

(2) *Method*.—The instructor indicates a point target to the squad leader. After firing has commenced, the instructor indicates and gives the nature of a new target to a flank. The squad leader applies the fire of his squad to the first target. When the second target is indicated, he switches what he believes an appropriate amount of fire from the first to the second target.

*e. Exercise No. 13*—(1) *Purpose*.—To teach target designation, fire control, and the method of searching a small area with automatic rifle fire.

(2) *Method*.—The instructor indicates and gives the nature of two-point targets. After firing has commenced, the instructor indicates a small area in which an enemy group is under cover. The squad leader applies the fire of his squad on the two-point targets according to their nature. When the area target is indicated, he switches the fire of his automatic rifleman to that target.

*f. Exercise No. 14*—(1) *Purpose*.—To teach the application of fire on an enemy group marching in formation, the fire control necessary to obtain fire for surprise effect, and to show the effect of fire on troops in formation.



(2) *Method.*—The instructor indicates to the squad leader a target that represents a small group of the enemy marching in approach march formation, formation for patrol, or the like; the enemy not being aware of the presence of the squad. The squad leader applies the fire of his squad; his instructions must result in the simultaneous opening of fire of all weapons and the distribution of fire over the entire target. The assignment of the three riflemen on the right to fire at the rear half of the target, and the remaining riflemen at the forward half, is a satisfactory method of distributing fire over such target. The automatic rifleman will normally fire at that part of the target that presents the greatest mass.

## SECTION VII

### FIRING AT FIELD TARGETS

30. *Scope of training.*—The training in this step is similar to that given the soldier in landscape target firing, but with the added features of firing the service rifle at field targets at unknown ranges, the use of cover, fire control under more difficult conditions, and range estimation.

31. *General considerations*—*a. Movement.*—Musketry exercises with field targets shall not involve movement of the firing unit beyond the initial firing position. The inclusion of the training in moving from an approach-march formation, or place of concealment, to firing positions is, primarily, to teach the soldier the proper use of cover and selection of firing positions.

*b. Firing positions and representation of enemy.*—(1) A unit shall not be deployed in a line of skirmishers, that is, with individuals approximately abreast and at regular intervals apart, when under enemy fire or observation. Accordingly, the firing position of a squad or section will be the general line formed by the firing positions of individuals and small groups (two to four men), disposed laterally and in depth at greatly varying distances. The selection of individual and group positions is governed by the field of fire, cover or concealment while firing, cover of approach to those positions, fire control, and nature of target.

(2) The representation of the enemy by targets will conform to that principle.

**32. Situations for firing exercises.**—*a.* Each exercise will be initiated by a unit either—

(1) Already deployed in a firing position.

(2) Halted in approach-march formation or in a place of concealment with scouts present in formation, the unit either acting alone or as part of a larger force.

(3) Advancing in approach-march formation, with scouts out.

*b.* In situation (1) above each man will be in a carefully selected firing position, special attention being paid to individual cover and concealment.

*c.* In situation (2) above squad leaders select the firing positions for the members of their squads; they conduct their squads forward by concealed routes and send the riflemen to their firing positions by individual directions. Occupation of the initial firing position of a unit is done with the minimum of exposure.

*d.* In situation (3) above the scouts must be checked by an assumed enemy fire when they are at a suitable location for a firing position of the squad; otherwise, if they are permitted to advance beyond this position, they must be withdrawn from the exercise before firing is begun by the squad.

**33. Use of cover.**—*a.* The use of available cover is important for two reasons. The man who neglects the use of cover will be seen and hit. His squad not only loses the fire effect of one rifle, but its position is unnecessarily disclosed and other casualties may follow.

*b.* The individual use of cover and concealment is taught in scouting and patrolling. In musketry the principles are the same.

*c.* In seeking cover in a firing position men may move a few yards in any direction, but they must not be allowed to bunch together behind concealment which does not afford protection from fire. They avoid positions which will mask the fire of others or cause their own fire to be dangerous to other men of their unit.

**34. Moving targets.**—When firing at a man walking across, or at right angles, to the line of fire the points of aiming at the various ranges are as follows:

*a.* At 100 yards, aim at forward half of body.

*b.* At 200 yards, aim at forward edge of body.

*c.* At 300 yards, lead him one-half the width of his body.

*d.* At 400 yards, lead him the width of his body.

**35. Marksmanship applied.**—*a.* The principles of rifle marksmanship are followed in combat in so far as they fit the conditions, but whenever the conditions make a modification of the principles more effective than strict and detailed compliance with them, such modification is properly made.

*b.* The principles of marksmanship should be applied to musketry and to combat in a common-sense way. It should be appreciated that the conditions encountered in each combat situation will differ from those found on the target range. For example, it will often be impracticable to keep the sights blackened in combat, although it will be of advantage to do so when possible. On the target range the soldier is expressly prohibited from resting his rifle against an unauthorized rest while firing. In battle the soldier takes advantage of trees, rocks, or any other rest which will make his fire more accurate. The positions used in rifle marksmanship are used in combat whenever the ground will permit, but on rough ground it is often necessary to modify them in order to get a comfortable and steady position. The loop sling is preferable except—

- (1) In the standing position.
- (2) When the situation requires readiness for immediate use of the bayonet.
- (3) In emergencies demanding immediate fire without time for adjustment of the loop sling.

**36. Use of the battle sight.**—The battle sight corresponds to a range of about 550 yards. It is less accurate than the peep sight and is used only when time is lacking for setting the peep sight, or in firing at aircraft. By keeping the sight habitually set at 300 yards when not in use, the soldier has two sights ready for emergencies.

**37. Rate of fire.**—*a.* In rapid-fire exercises the soldier is trained to shoot from 7 to 10 aimed shots per minute, depending on the range. In battle the difficulty in picking out indistinct targets will generally make a slower rate of fire advisable. Every shot must be carefully aimed and fired by squeezing the trigger as taught in rifle marksmanship or the fire will soon become scattered and ineffective.

*b.* It is impossible for leaders to prescribe or enforce the most effective rate of fire. It will vary with conditions and with individuals under the same conditions. It is the duty of

leaders, however, to control the rate of fire to the extent that they will correct men who fire so fast as to prevent careful aim and trigger squeeze, as well as those who waste time by improper reloading or by using poor positions. In the excitement of battle it is the tendency of men to fire too fast. This tendency must be overcome by training and by careful supervision in battle.

c. The most effective rate of fire for the automatic rifle is from 40 to 60 rounds per minute. The selection of the rate of fire to be used will be governed by the nature of the target.

**38. Assault fire.**—*a.* Assault fire can sometimes be used to advantage when within 150 yards of an enemy if his fire is not effective. It is particularly effective in woods fighting. Its moral effect may serve to keep the enemy down or drive him from the position. It has the disadvantage of making the attackers very conspicuous and vulnerable to the fire of any enemy troops within effective range.

*b.* While delivering assault fire the firing line advances at a walk. Riflemen halt individually, aim and fire, standing. They go forward a few steps, halt, and fire again, keeping on a general line. They load while advancing. Bayonets are fixed before taking up the assault fire. The automatic rifleman fires semi-automatic fire while steadily advancing; the piece being carried in a horizontal position with the butt tightly clamped under the arm pit. Riflemen fire straight to the front. Automatic riflemen distribute their fire along the enemy position within limits which will provide safety to the men on their right and left.

**39. Exercises**—*a. Exercise No. 15.*—(1) *Purpose.*—Practice in firing at moving targets.

(2) *Method.*—Riflemen and automatic riflemen fire individually at E targets carried on long sticks by men in the pits of a class A range. The men in the pits are each assigned a space, the width of about five regular range target spaces, in which they walk continuously back and forth. By whistle signal, targets are exposed to the firing line for five seconds and then concealed for five seconds. Targets are exposed once for each shot to be fired. On the firing line one man is assigned to each target. Ranges of 200 or 300 yards are best suited for this class of firing.

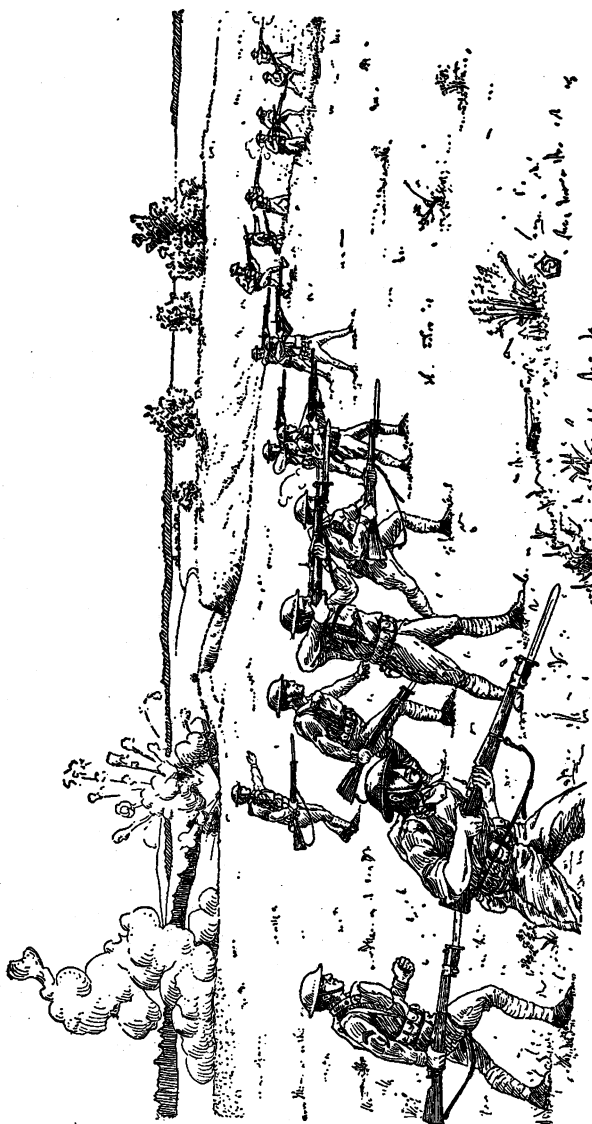


FIGURE 7.—Assault fire

*b. Exercise No. 16—*(1) *Purpose.*—Practice in target designation and application of the fire of a squad in position.

(2) *Method.*—Fairly visible targets, at about 400 yards range, represent the enemy in three small groups of from two to four men each. The squad is in position, with each man in a carefully selected firing position, particular attention being paid to individual concealment. The squad leader designates the targets and assigns the fire of his squad according to the nature of each target.

*c. Exercise No. 17—*(1) *Purpose.*—Practice in fire control and fire discipline of a squad in position.

(2) *Method.*—With the enemy represented by two groups of targets, the fire of the squad is applied as in Exercise No. 16. After 20 or 30 seconds of firing, a new target appears about 150 yards to the flank of the first target. As much of the fire power of the squad is diverted to the new target as is appropriate according to the nature of that target.

*d. Exercise No. 18—*(1) *Purpose.*—Practice in the application of automatic rifle fire over a small area in which an enemy is concealed.

(2) *Method.*—Targets are placed within a small area, exposed to fire but concealed from view. An automatic rifleman is directed to search that area with fire. He distributes his fire throughout the length and breadth of the area using a rapid rate of fire.

*e. Exercise No. 19—*(1) *Purpose.*—Practice in target designation by scouts and to teach how to approach and assume a firing position for a squad.

(2) *Method.*—The squad is marching in approach march formation with both scouts well in advance. When the scouts reach the firing position they observe the targets representing an enemy group about 400 yards to their front. They determine the range by firing on the target with tracer bullets. The squad leader conducts his squad forward, establishes the men in firing positions, and engages the targets with the proper class of fire, after the targets have been designated by the scouts by the use of tracers. Special attention is paid to the use of cover and concealment of all men while moving up and during the selection and occupation of positions.

*f. Exercise No. 20—*(1) *Purpose.*—Practice in the application of fire at an enemy formation.

(2) *Method*.—Fully exposed E targets are placed so as to represent about a squad of the enemy marching in patrol or other formation and with the longer axis of the formation at about right angles to the line of fire of the squad undergoing instruction. The latter squad is marching in combat patrol formation with one scout well in advance. When the scout reaches the firing point he observes the target, takes cover, and signals, "Enemy in sight in small numbers," to his squad leader. The squad leader places his squad in firing positions and engages the target with surprise effect. The fire control must be such that the fire will commence suddenly and in large volume. Special attention is paid to the concealment of all men until fire is begun. Fire is applied as in Exercise No. 14.

*g. Exercise No. 21*—(1) *Purpose*.—Practice in target designation and the application of the fire of a section in position.

(2) *Method*.—Partly exposed targets represent two squads of the enemy disposed in small groups and one machine gun, at a range of about 400 yards. The section leader applies the fire of his section by squads or smaller groups, according to the nature of the enemy group to which each is assigned.

*h. Exercise No. 22*—(1) *Purpose*.—Practice in fire control and fire discipline of a section in position.

(2) *Method*.—Partly exposed targets represent about a section of the enemy disposed in small groups about 400 yards to the front. The section leader applies the fire of his section on those targets. After about one-half minute of firing, targets representing a machine gun and three or four riflemen appear at a flank and at a greater range. The section leader diverts the appropriate amount of fire to the new targets.

*i. Exercise No. 23*—(1) *Purpose*.—To teach the section how to approach and assume an initial firing position, moving from a position of concealment; to give leaders practice in their duties.

(2) *Method*.—Four to six enemy groups are represented by partly exposed targets placed from 300 to 400 yards in the front. The platoon leader has ordered the section leader to move his section from its present place of concealment to a firing position to the front and engage the enemy by fire. The section leader makes a hurried survey or reconnaissance of the ground, gives his fire order to the assembled squad leaders, instructs them relative to routes of approach and areas to be

occupied, then controls the fire of his section when firing is begun. The squad leaders establish their squads in their assigned areas and engage the targets in conformity with the section leader's fire order.

## SECTION VIII

### SAFETY PRECAUTIONS AND ADVICE TO INSTRUCTORS

40. Safety precautions.—*a.* In general, the safety precautions used on the target range apply with equal force to musketry firing and even greater vigilance and care are necessary due to the irregular formations and the movement incident to some of the musketry exercises.

*b.* It will be explained to the troops that, in training, safety is the first consideration, and that whenever the firing of a musketry exercise is considered dangerous because of lack of training of the troops or for any other reason, the exercise will be modified so as to make it safe, or, if this is not practicable, it will be omitted.

*c.* When an exercise in which rifles are carried does not involve the firing of ball ammunition, rifles and belts will be inspected before the exercise to insure that no man has any ball ammunition in his position.

*d.* When ball ammunition is used it is preferably distributed when the unit is deployed on the firing point or initial point and the exercise is about to begin. Immediately upon the conclusion of the exercise all surplus ammunition will be collected and rifles and belts inspected to insure that none remain in the hands of the men.

*e.* For men of average training it is recommended that the following safety rule be enforced regarding the positions of men in an irregular firing line: No man will be farther to the front or to the rear of the man next in line than he is to the flank of that man. For instance, if the lateral interval between skirmishers is 5 paces, then no man will be more than 5 paces ahead of or behind the man next to him on either side. Furthermore, no man will fire in such direction that the bullet will pass closer than 6 feet to any man ahead of him who is not advancing, or closer than 30 feet to any man who is rushing forward. For poorly trained or excitable troops these



rules will be altered to provide the degree of safety necessary to prevent accidents.

*f.* The instructor in charge of an exercise is responsible for the safety of the firing, and it is his duty to take all safety precautions that he considers necessary under the conditions. No other officer can modify these safety precautions without assuming entire responsibility for the safety of the exercise.

*g.* During exercises rifles will be kept pointing down the range at all times. Special vigilance is necessary to see that men comply with this rule while using a cleaning rod to remove a cartridge or case which is stuck in the chamber.

*h.* Even when there are no targets or screen in front of a pit, overhead cover for the forward half of the pit will be provided.

*i.* Tracer ricochets are extremely erratic and for this reason the use of tracer ammunition is prohibited in all firing over pits occupied by personnel.

*j.* The firing of exercises will not be commenced until men in the pits have telephoned or signaled that all are under cover and the range clear.

*k.* Firing while advancing by rushes through woods or brush is dangerous because of the tendency of bullets to ricochet at wide angles after striking trees, stumps, and other obstacles.

**41. General notes for instructors.**—*a.* Practical musketry instruction, like marksmanship, includes the preparation of ranges and the procuring of equipment and supplies prior to the presentation of any exercise. Instructors must know thoroughly these details of instruction as well as the principles of musketry.

*b.* The time required for this preparation will depend largely on conditions and facilities at the post or camp where the instruction is to be given. Unless sufficient time is allowed the instruction will suffer.

*c.* The musketry training of regularly organized troops will generally be conducted by the company officers and supervised by higher commanders. In other cases, such as training camps, it will often be necessary or desirable to select specially qualified officers to conduct or supervise the training in musketry.

**42. Preparation by instructors.**—*a.* The conditions under which musketry instruction is given will vary greatly. On some occasions there will be plenty of time and facilities of all kinds.

Usually both time and facilities will be limited. The first duty of the instructor is to map out a definite course of instruction, making it as complete and effective as conditions will permit. Knowing the number of troops or students he is then able to make out a list of equipment and supplies needed and to make definite plans for work on the range. The instructor insures himself that his assistants are familiar with musketry and the subjects upon which it depends. He makes known to them his course of instruction.

b. A squad or section trained in advance for demonstration purposes will expedite instruction.

**43. Rifles.**—When class B rifles are available for musketry training they should be used in preference to class A rifles because of the injurious effects of tracer ammunition.

**44. Field targets.**—The appearance of the ordinary prone or kneeling silhouette depends a great deal upon the direction of the sun, the background of the targets, and the angle at which the targets are placed. Being flat, these targets have no appearance of solidity, and the effects of shade and shadow which render human targets visible at considerable distances are usually lacking in the case of silhouettes. These points should be taken into consideration in preparing an exercise, particularly when comparison of results is desired, to insure that all competing units have targets which are equally visible. The effect of solidity may be obtained by using two figures placed at right angles to each other or using a wide figure bent into a semicylindrical shape.

**45. Exercises.**—*a.* Instructors are not limited to the exercises given in the text. They should use their initiative and the available facilities in arranging additional exercises designed to give further practice in the application of musketry principles herein contained. Complex methods unsuited to battle conditions are to be carefully avoided in training.

*b.* It is generally desirable for the instructor to give a brief talk or critique at the close of each exercise. He explains how the exercise illustrates or gives practice in principles of musketry and calls attention to errors or to good work in the conduct of the exercise. Questions and discussion should be encouraged.

*c.* With some preparation most of the exercises can be fired on a class A range when there is no class B range available.

d. It is often desirable to rehearse exercises using simulated fire prior to firing them with ball ammunition.

e. To save time and ammunition, exercises may be executed by a single squad or section while the others look on. This expedient detracts from the thoroughness of training and is to be avoided when possible.

46. Interest.—a. The value of the course will depend largely upon the interest aroused. To arouse interest it is necessary to make men see the importance of the subject, giving illustrations of the application of musketry principles in battle.

b. To maintain interest requires that monotony be avoided by frequently introducing new ideas or new applications of principles. Many of the exercises can be treated as games or competitions.

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